Square-lattice photonic crystal bandedge laser array fabricated by laser holography process

C,-O Cho[1], J, Jeong[1], J. Lee[1], H. Jeon[1], and I. Kim[2]
[1]School of Physics and Inter-university Semiconductor Research Center, Seoul National University, Seoul 151-747, Korea
[2]Telecommunication R&D Center, Samsung Electronics Co., Suwon 442-370, Korea

We fabricated a photonic bandedge laser array based on a two-dimensional square-lattice photonic crystal slab waveguide using a laser holography method, instead of the commonly used electron-beam lithography. The nature of the laser holography process enabled high-throughput large-area fabrication of bandedge lasers. Moreover, the laser performance was comparable to that of reported counterparts written by electron-beam. Careful examination of the spectral positions of the observed modes with respect to the calculated photonic band structure identified three main bandedge modes as the origins of lasing: M2, X2, and M1. Owing to the gradual change in the air-hole size, the lasing modes shifted monotonically along the laser array, resulting in an M1 mode span of ~30 nm (centered at 1550 nm) over a distance of 5 mm.

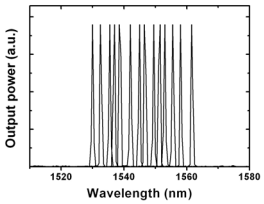

Fig. 1. M1 mode lasing spectra from bandedge laser array